

## **VENTILATION MATTRESS**

### **BACKGROUND OF THE INVENTION**

#### **1. Field of the Invention:**

The present invention relates to a mattress and, more particularly, to a ventilation mattress, which uses an electric fan to provide currents of air through air vents in the top layer of the outer covering for ventilation. The ventilation mattress can be made in any of a variety of forms for use as a seat mattress, sofa mattress, or bed mattress.

#### **10 2. Description of the Related Art:**

Straws and bamboo strips are commonly used for making cooling mattresses for the advantage of being highly ventilative. Lying or sitting on a cooling mattress during a hot weather is comfortable at the initial stage. However, a cooling mattress absorbs heat energy from the surrounding and the user's body when in use, its cooling effect is gradually diminished with the time in which the user sits or lies on the cooling mattress.

There are also known seat and bed mattresses formed of strings of ball or block elements. These seat and bed mattresses have open spaces in between the ball or block elements for ventilation. However, when sitting or lying on a seat or bed mattress of this design, the user's body will block the open

spaces, and the seat or bed mattress becomes hot within a short time.

In order to eliminate the aforesaid drawbacks, a seat mattress with enforced currents of air is developed. A seat  
5 mattress of this design comprises a hard inner layer, a breathing leather covering covered the hard inner layer, and an electric fan. The hard inner layer has air guide grooves adapted to guide air in a particular direction. The leather covering has air holes for exhaust of air. The electric fan is controlled to induce currents  
10 of air into the inside of the seat mattress. This design of seat mattress still has drawbacks. Because currents of air are guided in a particular direction, the ventilation effect is limited. Further, because the inner layer is a hard member, it is not comfortable to sit on the seat mattress.

## 15 SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. According to one aspect of the present invention, the ventilation mattress comprises an outer bag stuffed with a fabric stuffing member for ventilation. According  
20 to another aspect of the present invention, the fabric stuffing member is formed of interwoven spandex fibers and having open spaces for circulation of air through the at least one air inlet and

the air vents. According to still another aspect of the present invention, a flexible pad is provided at the bottom side of the fabric stuffing member to improved the flexibility and ventilation of the ventilation mattress. According to still  
5 another aspect of the present invention, high-performance fans are installed to draw air into the outer bag for circulation. According to still another aspect of the present invention, membrane type pressure switches are provided inside the outer bag and adapted to turn on the high-performance fans when the  
10 user sitting on the ventilation mattress, or to turn off the high-performance fans when the user left the ventilation mattress. According to still another aspect of the present invention, electric cooling fans or electric fans with electric heater means may be alternatively used. According to still  
15 another aspect of the present invention, semiconductor cooler chips may be used with the high-performance fans.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is an exploded view, partially cutaway, of a part of a ventilation mattress according to the present invention.

20 FIG. 2 is a sectional view in an enlarged scale of a part of the ventilation mattress according to the present invention.

FIG. 3 is a schematic sectional view showing the

ventilation mattress compressed according to the present invention.

FIG. 4 illustrates the ventilation mattress made in the form for use with a sofa according to the present invention.

5           FIG. 5 illustrates the ventilation mattress installed in a sofa according to the present invention.

FIG. 6 is a side view in section in an enlarged scale of FIG. 5.

FIG. 7 is similar to FIG. 4 but showing a double-sided  
10       adhesive tape used instead of mounting holes and screws.

FIG. 8 is similar to FIG. 4 but showing hook and loop materials used instead of mounting holes and screws.

FIG. 9 is an exploded view of an alternate form of ventilation mattress according to the present invention.

15           FIG. 10 illustrates the ventilation mattress of FIG. 9 installed in a chair.

FIG. 11 is an elevational view, partially cutaway, of another alternate form of the present invention, showing the ventilation mattress installed in a rack for bed.

20           FIG. 12 is a cutaway view of still another alternate form of the present invention, showing the ventilation mattress formed integral with a sofa.

FIG. 13 is similar to FIG. 12 but showing high-performance fans disposed at the bottom and back sides of the sofa.

FIG. 14 is a schematic side view of FIG. 13.

5        FIG. 15 is a schematic sectional view in an enlarged scale of a part of FIG. 13, showing the ventilation mattress compressed according to the present invention.

FIG. 16 is similar to FIG. 14 but showing the air inlets of the ventilation mattress connected to the air inlets at the  
10        bottom and back sides of the sofa.

FIG. 17 is an exploded view, partially cutaway, of a part of still another alternate form of the ventilation mattress according to the present invention.

FIG. 18 is a sectional view of the ventilation mattress  
15        shown in FIG. 17.

FIG. 19 is a sectional view of still another alternate form of the ventilation mattress according to the present invention.

FIG. 20 is a sectional view of a part of still another  
20        alternate form of the present invention, showing two fabric stuffing members arranged in a stack inside the outer bag of the ventilation mattress.

FIG. 21 is a sectional view of a part of still another alternate form of the present invention, showing two flexible pads arranged in a stack inside the outer bag of the ventilation mattress.

5           FIG. 22 is a sectional view of still another alternate form of the present invention, showing only one fabric stuffing member arranged inside the outer bag of the ventilation mattress.

FIG. 23 is a sectional view of still another alternate  
10 form of the present invention, showing only one flexible pad arranged in a stack inside the outer bag of the ventilation mattress.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to FIGS. 1~4, a ventilation mattress 1 is  
15 shown comprising an outer bag 11, a fabric stuffing member 13 put in the outer bag 11, a flexible pad 16 provided at the bottom side of the fabric stuffing member 13 inside the outer bag 11, an air inlet 12 formed in one side of the outer bag 11, a flexible tube 14 extended from the air inlet 12, and a high-performance  
20 fan 15 provided at one end of the flexible tube 14 remote from the air inlet 12. The fabric stuffing member 13 is three-dimensional device formed of interwoven spandex fibers.

132, having open spaces 1321 in it for ventilation. The outer bag 11 is formed of top and bottom fabric sheet layers 131, having small air vents 111 in the top side (top fabric sheet layer). The flexible pad 16 comprises a top cover layer 161, a bottom cover layer 162, a plurality of springy support members 163 connected between the top cover layer 161 and the bottom cover layer 162, an air passage 164 defined in between the top cover layer 161 and the bottom cover layer 162 around the springy support members 163, and a plurality of air vents 165 in the top cover layer 161 in communication between the air passage 164 and the air vents 111 in the top side of the outer bag 11. The fan 15 comprises an air output port 151 connected to the flexible tube 14, an air input port 152 in communication with the air output port 151, a grille 153 covering the air input port 152, an air filter 1531 mounted in the grille 153, a battery chamber 155, a set of battery cells 1551 mounted in the battery chamber 155, a battery lid 1552 covering the battery chamber 155, and a power cord 154 for connection to an electric socket to obtain the necessary working voltage. The fan 15 can obtain the necessary working voltage either from the set of battery cells 1551, or city power supply via the power cord 154. When starting the fan 15, electric currents are caused to flow from the air output port 151

into the air inlet 12 and then the open spaces 1321 in the interwoven spandex fibers 132 of the fabric stuffing member 13, and then to circulate through the air passage 164 and air vents 165 of the flexible pad 16, and then to flow out of the outer bag 11 through the air vents 111. Further, a membrane type pressure switch 112 is provided at the inner surface of the top fabric sheet layer 131 of the outer bag 11 and adapted to switch on/off the fan 15 when the user sits on or leaves from the ventilation mattress 1.

10 Referring to FIG. 1 again, a time delay switch 159 is provided to delay the acting of the off action of the membrane type pressure switch 112 for a predetermined length of time so that the fan 15 is maintained functioning if the user simply leaves from the ventilation mattress 1 for a short time, 15 preventing frequent on/off action of the fan 15.

Referring to FIGS. 4~6, the ventilation mattress 1 can be made to fit a sofa, having a plurality of air inlets 12, a plurality of flexible tubes 14 respectively extended from the air inlets 12, and a plurality of high-performance fans 15 respectively 20 fastened to the flexible tubes 14. Each fan 15 has a plurality of mounting holes 156 for fastening to a fixed place with screws 1561.



Referring to FIGS. 7 and 8, a double-sided adhesive tape 157 (see FIG. 7), or hook and loop materials 158 (see FIG. 8) may be used to fix each fan 15 to a fixed place instead of the aforesaid mounting holes 156 and screws 1561.

5           Referring to FIGS. 9 and 10 show an alternate form of the present invention. This embodiment of ventilation mattress 3 is suitable for mounting on a chair 4. According to this embodiment, the ventilation mattress 3 comprises an outer bag 31 having air vents 311, a fabric stuffing member 13 put in the  
10   outer bag 31, an air inlet 32 formed in one side of the outer bag 31, a flexible pad 16 provided at the bottom side of the fabric stuffing member 13 inside the outer bag 11, a flexible tube 14 connected to the air inlet 32, and a high-performance fan 15 provided at one end of the flexible tube 14 remote from the air  
15   inlet 22. The flexible pad 16 comprises a top cover layer 161, a bottom cover layer 162, a plurality of springy support members 163 connected between the top cover layer 161 and the bottom cover layer 162, an air passage 164 defined in between the top cover layer 161 and the bottom cover layer 162 around the  
20   springy support members 163, and a plurality of air vents 165 (not shown) in the top cover layer 161 in communication between the air passage 164 and the air vents 111 in the top side

of the outer bag 11. The fan 15 is similar to the embodiment shown in FIGS. 1~8 with the exception of the added electric power cord 1541, which is connectable to the socket for cigarette lighter in a motor vehicle.

5           FIG. 11 shows still another alternate form of the present invention. According to this embodiment, the ventilation mattress 5 is designed for mounting on a rack for bed 6. The ventilation mattress 5 comprises an outer bag 51 having air vents 511, a fabric stuffing member 13 put in the outer bag 51, a  
10   set of air inlets 52 formed in one side of the outer bag 51, a flexible pad 16 provided at the bottom side of the fabric stuffing member 13 inside the outer bag 51, flexible tubes 14 respectively connected to the air inlets 52, and high-performance fans 15 respectively installed in the flexible  
15   tubes 14 at one end remote from the air inlet 52. The flexible pad 16 is same as that shown in FIG. 2, comprising a top cover layer 161, a bottom cover layer 162, a plurality of springy support members 163 connected between the top cover layer 161 and the bottom cover layer 162, an air passage 164 defined in  
20   between the top cover layer 161 and the bottom cover layer 162 around the springy support members 163, and a plurality of air vents 165 in the top cover layer 161 in communication between

the air passage 164 and the air vents 111 in the top side of the outer bag 11. When the fans 15 started, induced currents of air are evenly distributed through the fabric stuffing member 13 and the flexible pad 16 and the air vents 511.

5           Further, a semiconductor cooler may be used with its cold side facing the air path between each fan and the inside space of the ventilation mattress and its hot side disposed outside the ventilation mattress (this design is practical for use in summer season). Alternatively, the semiconductor cooler may  
10 be used with its hot side facing the air path between each fan and the inside space of the ventilation mattress and its cold side disposed outside the ventilation mattress (this design is practical for use in winter season).

Referring to FIG. 12, the ventilation mattress may be  
15 directly formed integral with a sofa 2. According to this embodiment, the fabric stuffing member 13 is put in between the lining 21 and outer covering 22 of the cushion of the sofa 2, and the flexible pad 16 is provided at the bottom side of the fabric stuffing member 13 inside the outer covering 22. The outer  
20 covering 22 of the cushion of the sofa 2 has air vents 23. When the fans 15 started, induced currents of air flow through the open spaces in the fabric stuffing member 13 and the flexible

pad 16 to the outside of the sofa 2 via the air vents 23 of the outer covering 22.

Referring to FIGS. 13~16, the ventilation mattress is directly formed integral with the sofa 2, having air inlets 17 and 25 respectively extended from the lining 21 of the cushion of the sofa 2 to the bottom side and/or back side of the sofa 2 and a high-performance fans 15 installed in the bottom air inlet 17 and 25 at the back and bottom sides of the sofa 2. Further, the flexible pad 16 has a bottom air inlet 166 adapted to guide air from the bottom air inlet 17 in the lining 21 of the cushion of the sofa 2 for ventilation through the air passage 164 and air vents 165 of the flexible pad 16, the fabric stuffing member 13 and the air vents 23 in the outer covering 22 of the sofa 2.

The ventilation mattress works subject surrounding temperature status. When used in a room where a cooler is functioning, the fans 15 draw cooling air to circulate through the ventilation mattress. When used in a space where an air conditioner provides hot air, the fans 15 draw hot air to circulate through the ventilation mattress. The invention can also be made in such a manner that the fans 15 draw hot air out of the ventilation mattress in direction from the air vents 111 toward the inside of the fabric stuffing member 13

FIGS. 17 and 18 show still another alternate form of the present invention. According to this embodiment, the ventilation mattress 1 comprises an outer bag 11, a fabric stuffing member 13 put in the outer bag 11, a flexible pad 16 provided at the bottom side of the fabric stuffing member 13 inside the outer bag 11, a flexible tube 14 extended from the outer bag 11 at one side and defining therein an air inlet 12 and an air outlet 121, a meshed frame device 19 mounted inside the outer bag 11 at one side remote from the flexible tube 14 and defining an air circulation chamber 191 for guiding air from the air inlet 12 and the inside space of the fabric stuffing member 13 toward the inside space of the flexible pad 16 and the air outlet 121, a high-performance fan 15 provided at one end of the flexible tube 14 remote from the outer bag 11 and adapted to draw currents of air into the air inlet 12, a semiconductor cooler chip 18 mounted in the flexible tube 14 and having its cold side 181 disposed in the air inlet 12 and its hot side 182 disposed in the air outlet 121, and membrane type pressure switches 112 are provided at the inner surface of the top fabric sheet layer 131 of the outer bag 11 and adapted to switch on/off the fan 15 when the user sits on or leaves from the ventilation mattress 1, and a time delay switch 159 adapted to delay the acting of the off action of the

membrane type pressure switches 112 for a predetermined length of time so that the fan 15 can be maintained functioning if the user simply leaves from the ventilation mattress 1 for a short time, preventing frequent on/off action of the fans 15. The

5 fabric stuffing member 13 is three-dimensional device formed of interwoven spandex fibers 132, having open spaces 1321 in it for ventilation between the air inlet 12 and the air circulation chamber 191. The outer bag 11 is formed of top and bottom fabric sheet layers 131, having small air vents 111 in the top

10 side (top fabric sheet layer). The flexible pad 16 comprises a top cover layer 161, a bottom cover layer 162, a plurality of springy support members 163 connected between the top cover layer 161 and the bottom cover layer 162, an air passage 164 defined in between the top cover layer 161 and the bottom cover layer 162

15 around the springy support members 163 for ventilation between the air circulation chamber 191 and the air outlet 121. The fan 15 comprises an air output port 151 connected to the flexible tube 14, an air input port 152 in communication with the air output port 151, a grille 153 covering the air input port 152, an

20 air filter 1531 mounted in the grille 153, a battery chamber 155, a set of battery cells 1551 mounted in the battery chamber 155, a battery lid 1552 covering the battery chamber 155, and a power

cord 154 for connection to an electric socket to obtain the necessary working voltage. The fan 15 can obtain the necessary working voltage either from the set of battery cells 1551, or city power supply via the power cord 154. Therefore, when started,  
5 the fan 15 draws currents of air into the inside space of the fabric stuffing member 13 toward the air circulation chamber 191 over the cold side 181 via the air inlet 12, enabling cold air to pass out of the ventilation mattress 1 through the air vents 111, and at the same time hot air is guided out of the ventilation  
10 mattress 1 through the air outlet 121.

FIG. 19 shows still another alternate form of the present invention. This embodiment is substantially similar to the embodiment shown in FIGS. 17 and 18 with the exception that the outer bag 11 has only one air inlet 12 without the aforesaid  
15 air outlet 121; the semiconductor cooler chip 18 has its cold side 181 disposed in the air inlet 12 and its hot side 182 disposed outside the outer bag 11.

Although particular embodiments of the invention have been described in detail for purposes of illustration, various  
20 modifications and enhancements may be made without departing from the spirit and scope of the invention. For example, the fans used can be cooling fans for use in hot weather, or fans with

electric heater means for use in cold weather; the ventilation mattress can be made having only the fabric stuffing member **13** (see FIG. 22) or the flexible pad **16** (see FIG. 23) stuffed in the outer bag **11**, or having two fabric stuffing members **13** arranged  
**5** in a stack inside the outer bag **11** (see FIG. 20), or having two flexible pads **16** arranged in a stack inside the outer bag **11** (see FIG. 21). Accordingly, the invention is not to be limited except as by the appended claims.